Revista Catarinense da CIÊNCIA CONTÁBIL

ISSN 2237-7662, Florianopolis, SC, v. 23, 1-17, e3430, 2024
DOI: 10.16930/2237-7662202434302
Available at http://revista.crcsc.org.br

ESG INVESTMENTS IN THE COVID-19 PANDEMIC: WERE THERE SUPERIOR FINANCIAL AND SHAREHOLDER PERFORMANCES?

RAFAEL MOUTINHO[1]
Universidade de São Paulo
https://orcid.org/0000-0002-1332-291X
rafael.moutinho@usp.br

RICARDO LUIZ MENEZES DA SILVA
Universidade de São Paulo
https://orcid.org/0000-0001-5437-1657
rlms@fearp.usp.br

ABSTRACT

The objective of this study is to analyze the effect of investment in environmental, social and governance (*ESG*) factors on the financial performance of Brazilian companies and on the accumulated abnormal return during the Covid-19 pandemic period. To this end, two theoretical portfolios of the Brazilian market were compared: one composed of *ISE* (Sustainability Index) companies and the other of Ibovespa companies. The impact of financial performance variables on Abnormal Returns during the Covid-19 pandemic period was analyzed using the Event Study method. This study obtained mixed results. *ISE* companies obtained higher *CAR* for the period of the pandemic, demonstrating greater resilience during the crisis. In addition, lower volatility was observed for *ESG* stocks. The results of the regression models did not identify a positive relationship between profitability indicators and *CAR* for *ISE* companies. On the other hand, in line with the hypotheses of this study, there was a positive association between *Tobin's Q* of *ESG* companies and *CAR*. This research can be useful for academics and investors, as it expands the evidence of *ESG* investments in terms of financial performance in an emerging market, such as Brazil, and their resilience in times of crisis. Finally, managers, investors, creditors and other professionals may be interested in the results of this research, since *ESG* investments can develop a competitive advantage, contributing to the long-term success of the business.

Keywords: *ESG*. Covid-19. Financial Performance. Abnormal Return.

Edited in Portuguese and English. Original version in Portuguese.

Paper presented at the 23rd USP International Conference on Accounting, July 26-28, 2023.

[1] **Mailing address:** Av. Bandeirantes, 3900 | Vila Monte Alegre | 14040-905 | Ribeirão Preto/SP | Brazil.

Received on: 09/27/2023. **Revised on**: 11/27/2023. **Accepted on** 01/23/2024 by Prof. Dr. Rogério João Lunkes (Editor-in-Chief). **Published on** 02/22/2024

1 INTRODUCTION

Investors around the world are increasingly incorporating environmental, social, and governance (*ESG*) criteria into their investment decisions, reflecting growing concern about environmental degradation and the scarcity of resources facing the world (Olli, 2021). Broadstock et al. (2021) pointed out that, in 2019, the capitalization of *ESG*-focused bond portfolios in major markets exceeded US$30 trillion. As a result, companies are increasingly aware of the need to engage in socially responsible activities, both to attract new investors and to defend themselves against pressure from interest groups and the specialized media (Cornell & Damodaran, 2020). As the authors point out, the inclusion of *ESG* criteria in investment decisions has gained importance, especially among large institutional investors. According to Cornell and Damodaran (2020), Bloomberg reported in 2019 that in Europe alone, US$12 trillion was directed towards *ESG* investments. Worldwide, there was an 80% increase in *ESG* investments in 2020 (Plastun et al., 2021). With companies' attention turning to *ESG* practices, the accounting and financial literature has debated their effects on companies' financial performance (Azmi et al., 2021; Buallay, 2018; Crisóstomo et al., 2011; Garcia et al., 2017; Kanamura, 2021; Olli, 2021). On the one hand, social responsibility actions could represent additional costs and reduce the profitability of companies, however, such actions would tend to improve financial performance by reducing possible labor or environmental liabilities, or by improving the company's image among consumers (Cavalcante et al., 2009).

There is a divergence of results regarding the financial impacts of *ESG* investment. Some authors have found negative or mixed evidence for the relationship between *ESG* investments and financial performance (Buallay, 2018; Crisóstomo et al., 2011; El Ghoul & Karoui, 2016; Jagannathan et al., 2017; Nguyen et al, 2020; Olli, 2021), while other studies have identified that companies with greater *ESG* investment have better financial performance (Azmi et al., 2021; Broadstock et al., 2021; Garcia et al., 2017; Kanamura, 2021; Mantovani & Belli, 2019; Silva & Câmara, 2015). In this sense, there is no consensus in the literature on the subject. With this in mind, there is the possibility of contributing to this theme. However, unlike previous studies, we seek to add the context of the Covid-19 pandemic as an opportunity to deepen studies on the relationship between *ESG*, performance and value of entities (Albuquerque et al., 2020). One of the reasons for this is due to the exogenous shock provided by the pandemic, which allows comparison between *ESG* index stocks and other portfolios, in terms of stock performance and financial indicators. In this context, international literature has compared the performance of *ESG* index companies with traditional market indices (Albuquerque et al., 2020; Bae et al., 2021; Beloskar & Rao, 2023; Plastun et al., 2021). This study advances by exploring this issue in the Brazilian context. In other words, do *ESG* companies perform differently in the Brazilian market? Furthermore, this study is justified by the need to understand the performance of these portfolios in times of crisis, in order to assess any competitive advantage of the businesses that make up the *ESG* index.

On March 11, 2020, the World Health Organization (WHO) declared a pandemic for the Covid-19 disease, caused by the coronavirus (SARS-CoV-2) (PAHO, 2020). The pandemic has had serious repercussions for public health, and the subsequent lockdown has also negatively impacted the global economy (Albuquerque et al., 2020). The North American, British, Chinese and other emerging markets suffered severe falls in the first months of the crisis, with the potential to repeat the 2008 global financial crisis (Shehzad et al., 2020; Yoo et al., 2021). To protect themselves from the fall in the stock market and its volatility, many investors saw socially responsible companies as an alternative for seeking sustainable returns, taking advantage of the growth in *ESG* investments (Harabida et al., 2022). In addition, there is evidence that companies that invest in *ESG* are less exposed to risks and, consequently, more resilient in times of crisis (Beloskar & Rao, 2023; Broadstock et al., 2021; Kanamura, 2021). Despite this, Plastun et al. (2021) observed that price effects are not stronger during a crisis period for *ESG* and conventional

portfolios, which justifies the need for further empirical research. Therefore, this study compares the performance of the *ISE*[1] theoretical portfolio, which represents the *ESG* criteria, whereas Ibovespa, during the Covid-19 pandemic period, used the event study method. This study also explores the effects of the financial performance of Brazilian companies, with and without *ESG*, on the Cumulative Abnormal Return (*CAR*). The financial performance proxies used are Return on Assets (*ROA*), Return on Equity (*ROE*) and *Tobin's Q*.

The results of this study are mixed. Firstly, the companies in the *ISE* portfolio obtained higher cumulative abnormal returns for the period of the pandemic, demonstrating how the shares of these companies were more resilient during the period under study, consistent with Broadstock et al. (2021). In addition, there is less volatility in *ESG* stocks. This result demonstrates that *ESG* companies can reduce exposure to systematic risk, resulting in lower devaluation of the value of securities. Secondly, the results of the regression models did not identify a positive relationship between the *ROA* and *ROE* of *ESG* and *CAR* investments. On the other hand, in line with the developed hypotheses, a positive association was identified between *Tobin's Q* of *ESG* companies and *CAR*, revealing evidence of competitive advantage.

It is hoped that the results of this study will be useful for investors who use accounting information to make investment decisions, by analyzing trends based on traditional indicators of economic and financial analysis of companies engaged in *ESG* investments. In addition, the analysis of the Covid-19 pandemic period contributes to the literature by expanding evidence on investment strategies in times of economic crisis, showing the resilience of socially responsible investments in times of crisis. Finally, it should be noted that this research can contribute to regulatory and standard-setting bodies in their recent initiatives to propose standards for sustainable, social and governance indicators.

2 LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

In recent decades, the *ESG* pillars of companies have gained attention from consumers, employees, regulators and other stakeholders, and non-financial social and environmental indicators have gained relevance for investors (Khan, 2019). Among the reasons that have caused this increase in interest in sustainability are the scarcity of natural resources and environmental degradation, as well as the occurrence of notorious corporate scandals, such as the case of Enron in 2001, and Volkswagen, which manipulated gas emission reports in 2015, undermining investor confidence in the companies (Olli, 2021). The aforementioned author adds that the *ESG* rating or score is a statement about the quality and standards of a company's environmental, social and governance factors, in addition to seeking to measure the relevant *ESG* financial risks.

Although *ESG* is a recent term, the idea of integrating non-financial data, such as environmental and social factors, is not new, and can be found in terms such as CSR (Corporate Social Responsibility), which refers to the activities of companies that seek to be socially responsible, with the difference that *ESG* incorporates governance factors (Gillan et al., 2021; Khan, 2019). Garcia et al. (2017) suggest that the behavior of companies in relation to sustainability can be explained by the influence of the institutional environment in which they are inserted, which creates the need for them to position themselves in relation to environmental, social and governance factors for institutional and economic agents. Currently, there is a legal framework that reflects the concern for sustainability in various jurisdictions. The European Union (EU), for

[1] The ISE B3 is the result of a theoretical portfolio of assets, drawn up in accordance with the criteria established in this methodology. The aim of the ISE B3 is to be an indicator of the average performance of the share prices of companies selected for their recognized commitment to corporate sustainability, supporting investors in making investment decisions and inducing companies to adopt the best sustainability practices, since ESG practices contribute to the sustainability of businesses (B3, 2021).

example, has introduced new legal requirements to promote responsible actions to which companies must adapt (Olli, 2021). These requirements oblige companies to report non-financial information related to social and environmental operations. This encourages companies to be more socially and environmentally responsible, since both financial results and non-financial indicators are under scrutiny by investors.

Azmi et al. (2021) state that one theory capable of explaining the relationship between *ESG* activity and companies' financial performance is the Stakeholder Theory. This theory, seen primarily as a moral theory, states that it is the company's obligation to maximize value for its stakeholders (Parmar et al., 2010). Stakeholders are defined as any group or individual that affects or is affected by the company's activities, including shareholders, employees, suppliers, customers, regulatory bodies and other groups. With this, companies that invest in *ESG* factors are demonstrating engagement with stakeholders, which can result in greater opportunities and avoiding contractual, union and government costs (Azmi et al., 2021).

Olli (2021) pointed out that, in the existing literature on *ESG* investments, the results are not consistent. According to Azmi et al. (2021), *ESG* investments can either improve company performance or result in inefficiency. Table 1 shows the divergence of results found by papers regarding the financial impacts of *ESG* investment.

Table 1

Results of papers researching the financial impacts of ESG/CSR

Authors	Metrics	Results found
Crisóstomo et al. (2011)	*ROA*, *ROE*, *Tobin's Q*	Negative evidence
Silva e Câmara (2015)	Market value	Positive evidence
El Ghoul e Karoui (2016)	Performance and flows of investment funds	Negative evidence
Garcia et al. (2017)	*ROA*, DCF	Mixed evidence
Jagannathan et al. (2017)	Stock quotes	Positive evidence
Nguyen et al. (2020)	Stock values, profitability and their volatilities	Mixed evidence
Buallay (2018)	*ROA*, *ROE*, *Tobin's Q*	Mixed evidence
Mantovani e Belli (2019)	Market value measured by *Tobin's Q*	Positive evidence
Broadstock et al. (2021)	CSI 300 Chinese market index	Positive evidence
Azmi et al. (2021)	*ROA*, *ROE*, *Tobin's Q*	Positive evidence
Kanamura (2021)	High-yield Bond Exchange-Traded Funds (ETFs)	Positive evidence
Olli (2021)	*ROA*, *Tobin's Q*	Mixed evidence

Note. ROA is return on assets, *ROE* is return on equity, DFC is financial performance based on discounted cash flow.

Mantovani and Belli (2019) and Silva and Câmara (2015) found significant relationships between *ESG* activities and the market value of companies. The latter stated that investors value organizations that have a high level of transparency, ethical values and that treat their stakeholders equally. According to Jagannathan et al. (2017), companies that invest in *ESG* have less exposure to risk because they are better able to adapt not only to new environmental crises, but also to new regulations, technologies and consumer preferences. A study of banks in emerging economies found a positive relationship between *ESG* activities and market value, *ROA* and *ROE* (Azmi et al., 2021). According to Olli (2021), the positive evaluation caused by *ESG* can be explained by high *ESG* performance and improved communication between stakeholders and the company, resulting in increased company value.

On the other hand, Crisóstomo et al. (2011) stated that corporate social responsibility activities tend to negatively affect the value and financial performance of companies; possibly due to the high costs arising from environmental and social actions. El Ghoul and Karoui (2016)

showed that levels of corporate social responsibility are negatively related to the performance of investment fund flows and, therefore, would have difficulties attracting investors. Garcia et al. (2017) found no evidence that investors in emerging countries value *ESG* investment. Olli (2021) identified a negative relationship between *ESG* and *ROA* for companies in sensitive, potentially polluting sectors, such as oil and gas, mining and chemical industries. This negative impact can be explained by the fact that these companies invest more in environmental activities, reducing profitability, possibly encouraged by their history of fines and sanctions. Along these lines, Nguyen et al. (2020) found that more *ESG* investments do not lead to greater profitability. Buallay (2018) analyzed the components of *ESG* separately, and found that investment in environmental sustainability negatively affects *ROA*. The author also observed that the social aspect negatively affects *ROA*, *ROE* and the company's market value, and finally, governance negatively affects *ROA* and *ROE*. Cornell and Damodaran (2020) commented that few studies have identified a relationship between *ESG* investment and greater profitability or stock valuation; they also add that researches showing a positive relationship were not able to establish causality, i.e. they were not able to demonstrate whether high investment in *ESG* leads to greater valuation of companies, or whether larger companies have a greater capacity to make more robust investments in *ESG*.

The studies presented above show controversial results on the relationship between *ESG* and performance indicators. However, the Covid-19 pandemic brought an exogenous shock that originated from public health concerns, resulting in a stock market crash. The unexpected and exogenous nature of the shock suggests that companies had a very limited capacity to respond in a timely manner to the crisis. As a result, the stock market reacted mainly to companies' pre-existing conditions that affected their ability to withstand the crisis. The crisis creates the opportunity to deepen the evidence on the relationship between *ESG*, performance and value of entities (Albuquerque et al., 2020). For example, Broadstock et al. (2021) and Kanamura (2021) used data from the initial shock of the Covid-19 pandemic to analyze the performance of securities and market indices; the authors found that the devaluation of indices incorporating *ESG* stocks was lower compared to other indices, showing that stocks with high *ESG* performance are more resilient in periods of crisis, reducing their exposure to systematic risk. Beloskar and Rao (2023) analyzed from an event study, when studying another emerging market, such as India, that companies in the Indian market with better *ESG* indices provided more consistent returns and lower volatility during the Covid-19 pandemic. On the other hand, Bae et al. (2021) analyzed the return of sustainable indices in the US market during the pandemic period and found no significant difference between the pre-crisis and the crisis. Plastun et al. (2021) investigated whether *ESG* indices are more or less efficient compared to conventional indices, and concluded that the price effects for the two portfolios are not stronger during a period of crisis.

As a result, the literature on this topic has obtained mixed results (see Table 1), with some studies showing that *ESG* stocks have performed better during the pandemic, and also had lower volatility, as well as better profit margins (Albuquerque et al., 2020; Yoo et al., 2021). Although the results for stock returns are not consistent in emerging markets (Harabida et al. 2022), the exogenous shock provided by the Covid-19 pandemic represents an opportunity to compare *ESG* stocks and other portfolios, in terms of stock performance and financial indicators. Based on the assumption that *ESG* investments result in a competitive advantage for companies, it is hoped to find results that can show the positive effects of these investments, either in terms of improving company performance or stock returns. Thus, two research hypotheses are presented:

H1: ESG stocks presented better performance and lower volatility during the Covid-19 pandemic.

H2: ESG stocks had better ROA, ROE and Tobin's Q financial indicators during the Covid-19 pandemic.

3 METHODOLOGY

3.1 Event study and financial variables of the regression models

The method used is the Event Study, which examines the behavior of the market values of securities around certain corporate events, in order to verify whether the effect of an event is reflected in the stock price (Kirck, 2019). It should be noted that the empirical method is widely used in accounting and finance literature, under the assumption that the market has semi-strong efficiency, in which public information is quickly reflected in stock prices (Soares et al., 2002). To assess the financial impacts of *ESG* investment on Brazilian companies, the performance of two market portfolios is compared: i) the first corresponds to the Corporate Sustainability Index (*ISE*) of B3, which includes companies with *ESG* investments; ii) the second portfolio is Ibovespa, excluding the companies that make up the *ISE*, ensuring that no company is included in both portfolios. Thirty-two companies were removed from the list of companies that make up the Ibovespa portfolio because they belong simultaneously to the *ISE* portfolio. Among the companies on the *ISE* index at the time this research was conducted, Assaí was excluded from the sample because it had just gone public and had no data available for the period analyzed. The *ISE* and Ibovespa portfolios were consulted on the B3 website on June 13, 2021 (B3, 2021).

The window of the studied event is the period of the Covid-19 pandemic in Brazil from March 2020 to April 2021, the month in which the economy began to show signs of recovery and stabilization, according to projections by relevant market agents reported in the economic press (Cucolo, 2021). The event was chosen because it caused a major negative impact on the financial market; in addition, companies that invest in *ESG* would be less exposed to risks and, consequently, more resilient to disasters and crises (Broadstock et al., 2021; Kanamura, 2021).

In order to verify the impact of the pandemic on the stock returns of the companies that make up the two theoretical portfolios, the Cumulative Abnormal Return (*CAR*) was measured, according to Campbell et al. (1997). In addition, it was necessary to calculate *ROE*, *ROA* and *Tobin's Q* (Azmi et al., 2021; Buallay, 2018; Garcia et al., 2017; Olli, 2021). The data to calculate *ROE , ROA* and *Tobin's Q* was collected from the Economatica® database. *ROE* is calculated as net income divided by shareholders' equity, while *ROA* is net income divided by average total assets. *Tobin's Q* is total assets minus book value of equity, plus market value of equity, over total assets. *Tobin's Q* is a notable indicator in scientific circles and is used in models to analyze causal relationships between firm value and other variables. In addition, this indicator has been used by several authors, as shown in Table 1. Famá and Barros (2000) explain that the replacement value of assets is necessary to estimate *Tobin's Q*. However, they explain that it is very difficult to obtain the replacement value. In this sense, Kammer and Alves (2009) present other approaches developed to estimate *Tobin's Q*, also known as simplified approximations, which can result in correspondence with more elaborate methods (Famá & Barros, 2000).

As the analyzed period mostly covers 2020, two possibilities were considered: collecting market values on December 31, 2020, or collecting values on March 31, 2021, after the market's reaction to the release of the financial statements for 2020. For this reason, *Tobin's Q* was calculated with the market values for both dates, and it was found that the difference between the results was not significant. Therefore, the market values on December 31, 2020 were considered for the purposes of calculating *Tobin's Q*. In this sense, considering the existing literature, the *CAR* could be explained by the following variables in Equation (1):

$$CAR_{it} = \alpha_{it} + \beta_1 ESG_{it} + \beta_2 Performance_{it} + \beta_3 ESG * Performance_{it} + \beta_4 SIZE_{it} + \beta_5 LEV_{it} + \beta_6 CAPEX_{it} + \varepsilon_{it} \quad (1)$$

The dependent variable *CAR* refers to the Cumulative Abnormal Return for a set of companies during the pandemic period, encompassing the impact of the capital market on the

return of the shares of the companies that make up the *ISE* and Ibovespa portfolios. The *CAR* represents the cumulative return. The following variables are used to measure the financial performance of companies: *ROA*, *ROE*, and *Tobin's Q*. As a result, it was decided to run three regression models for each of these three variables, since they are highly correlated and can explain the same part of the abnormal return, as well as avoiding multicollinearity problems. A dummy variable for *ESG* was added to check whether the *ESG* component of *ISE* companies significantly affects abnormal returns. Interaction variables were also added to ascertain the influence of *ESG* on the performance variables in each model. The method used to estimate the coefficients was Ordinary Least Squares (OLS).

The other variables are covered in the *ESG*/CRS literature and reflect the presence or absence of financial performance. The control variables, used because of the differences between the companies analyzed, are: Size (*SIZE*), which is calculated by the natural logarithm of the company's total assets; Leverage (*LEV*), calculated by dividing total debt by total assets, acting as a proxy variable for the company's risk; and *CAPEX* (capital expenditure), calculated by total capital expenditure divided by total assets, as a proxy for the investments made by the company in the year. The variables total assets, total debt and *CAPEX* were collected from Economatica® (Azmi et al., 2021; Buallay, 2018; Garcia et al., 2017; Olli, 2021). The expected signs are shown in Table 2.

Table 2
Description and expected signs for the variables

Variable	Description	Expected sign
ESG	Dummy for *ISE* portfolio companies	+
ROE	Net income divided by shareholders' equity	+
ROA	Net income divided by total assets	+
Tobin's Q	Total assets minus book value of equity, plus market value of equity, over total assets	+
SIZE	Natural logarithm of total assets	+
LEV	Total debt over total assets	+
CAPEX	Capital expenditure over total assets	+

The expected sign for the *ESG* dummy variable is positive, since the works by Broadstock et al. (2021), Jagannathan et al. (2017), Kanamura (2021) and Silva and Câmara (2015) use stock market value data and find that *ESG* investments affect them positively. For the *ROA*ESG* interaction variable, the expected sign is positive, since the studies found in the literature present strong evidence that *ESG* practices and investments have a positive effect on companies' *ROA* (Azmi et al., 2021; Olli, 2021). Despite more controversial evidence for *ROE*ESG* (Buallay, 2018; Crisóstomo et al., 2011), more recent studies have identified positive results for this variable, so a positive sign is expected (Azmi et al., 2021). For the *Tobin's Q*ESG* interaction variable, a positive sign is expected, since the literature shows that *ESG* factors positively influence the market value of companies measured by *Tobin's Q* (Azmi et al., 2021; Buallay, 2018; Mantovani & Belli, 2019; Olli, 2021).

Equation (1) makes it possible to study the relationship between returns and the variables of interest. Some studies have used the same model logic: Horton and Serafeim (2009), Blaufus, Möhlmann and Schwäbe (2019), Gatzert and Heidinger (2020), Holland, Lindop and Wahab (2022). This model investigates whether the variables of interest contribute to explaining the cumulative abnormal return (*CAR*), since the return can reflect changes in the share price due to new information or events that alter the value of the company.

3.2 Measuring abnormal returns

In order to estimate the abnormal returns of a security, an approach was adopted which relates the return of a stock to the return of a market portfolio. To carry out this approach, we began by calculating the daily returns (Brown & Warner, 1985), using the continuous capitalization method, of the stocks that make up the *ISE* and Ibovespa portfolios using Equation (2):

$$R_i = \ln\left(\frac{P_t}{P_{t-1}}\right) \tag{2}$$

where R_i is the stock's return, P_t is the price of a given stock at t, and P_{t-1} is the price of a given stock at $t - 1$.

With the daily returns obtained, regressions were run between stock returns and portfolio returns to obtain the α_i and β_i, coefficients, which were then used to calculate the expected returns using Equation (4) of the market model. The regressions used 1,320 observations prior to the period of the event adopted. According to Campbell et al. (1997), the market model is a statistical model which, by relating the return of a market portfolio to the return of a given stock, can increase the chances of identifying the effects of events on the returns obtained. Equation (3) of the model used for any i action is:

$$\begin{aligned} &R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \\ &E[\varepsilon_{it}] = 0 \\ &Var[\varepsilon_{it}] = \sigma_{\varepsilon i}^2 \end{aligned} \tag{3}$$

where R_{it} is the return on security i, R_{mt} is the return on the market portfolio at a given t, ε_{it} is the disturbance term with mean zero and variance $\sigma_{\varepsilon i}^2$.

Based on the returns collected, the daily abnormal return for each security was estimated using Equation (4) below

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \tag{4}$$

where AR_{it} is the daily abnormal return of a security i on date t, Rit is the observed return of the security, and $(\alpha_i + \beta_i R_{mt})$ is the expected return of the security, calculated on the basis of the variables α_i and β_i found in the regression, and R_{mt},, which is the return of the market portfolio. In order to conclude on the impact of the event on the abnormal return, it must be aggregated. According to Campbell et al. (1997), aggregation can be done using two dimensions: one by time and by action, and the other which considers the aggregation of securities by time. In this sense, the accumulation of abnormal returns occurred over time and by action, as can be seen below.

$$CAR_i(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{it} \tag{5}$$

where *CARi* (Cumulative Abnormal Returns) refers to the aggregation of the abnormal return for multiple intervals within the event window. Then, the average abnormal return was obtained from the following equation:

$$\overline{CAR}_i(t_1, t_2) = \frac{1}{N}\sum_{i=1}^{N} CAR_i\,(t_1, t_2) \quad (6)$$

where *CAR* represents the aggregation of the cumulative abnormal return calculated in Equation (5).

4 ANALYSIS OF RESULTS

4.1 Descriptive statistics

This subsection presents descriptive statistics such as the average, median, standard deviation, and minimum and maximum values. Table 3 shows the descriptive statistics for the sample of companies in the *ISE* portfolio, and Table 4 for the sample of companies in the Ibovespa portfolio.

Table 3
Descriptive statistics for the ISE portfolio

	ROA	***ROE***	***Tobin's Q***	***SIZE***	***LEV***	***CAPEX***
Average	3.2%	8.3%	1.596	17.841	0.368	0.033
Median	3.5%	12%	1.307	17.603	0.345	0.029
Standard Deviation	4.6%	45&	1.215	1.524	0.205	0.030
Minimum	-10.5%	-165.8%	0.911	15.525	0.056	-0.032
Maximum	12%	171.3%	8.393	21.471	0.766	0.117

Note. Check the definitions of the variables in Table 4.

Table 4
Descriptive statistics for the Ibovespa portfolio

	ROA	***ROE***	***Tobin's Q***	***SIZE***	***LEV***	***CAPEX***
Average	1.4%	5.5%	2.244	16.831	0.303	0.049
Median	3.7%	11.7%	1.704	16.716	0.296	0.041
Standard Deviation	15.2%	47.9%	1.51	1.097	0.173	0.063
Minimum	-68.6%	-286.3%	0.851	14.189	0.001	-0.091
Maximum	35.3%	66.2%	7.51	19.985	0.779	0.376

Note. Check the definitions of the variables in Table 4.

From the descriptive statistics, it can be seen that the *ISE* portfolio has higher average and minimum *ROA* values than the Ibovespa portfolio, which is in line with the literature found, which states that investments in *ESG* can reduce financial risk during a crisis, resulting in higher *ROA* values (Azmi et al., 2021; Olli, 2021). It can also be seen that the average, minimum and maximum *ROE* values are also higher for the *ISE* portfolio, which can be explained by the evidence that investing in sustainability positively affects companies' *ROE* (Azmi et al., 2021; Buallay, 2018). The average value found for *Tobin's Q* was lower for the companies in the *ISE* portfolio, despite the fact that the literature shows that *ESG* factors positively influence the market value of companies (Azmi et al., 2021; Buallay, 2018; Mantovani & Belli, 2019; Olli, 2021). It can also be seen that the *ISE* portfolio has the highest average, minimum and maximum values for the *SIZE* variable, which, according to Cornell and Damodaran (2020), may indicate that larger companies are more likely to invest in *ESG*.

4.2 Abnormal returns

Based on the abnormal returns calculated for the stocks in the Ibovespa and *ISE* portfolios, the averages of each portfolio were analyzed for the pandemic period. For the graphical demonstration, the monthly averages and seven-day moving averages shown in the graphs in Figures 1 and 2 were used, so that possible abnormalities and oscillations could be detected. Average performance was well below expectations during the first month of the pandemic for both portfolios, as indicated by the average monthly abnormal return, which was significantly lower for the month of March 2020. This highlights the initial shock that companies in various sectors went through. The graph of monthly averages shows that the *ESG* portfolio obtained higher abnormal returns than the Ibovespa portfolio for the first three months of the pandemic. The moving averages chart also shows that the *ESG* portfolio had lower volatility of abnormal returns for the same period compared to the Ibovespa portfolio. These events can be explained by the literature, for example, Broadstock et al. (2021) and Kanamura (2021) observed that shares in companies with *ESG* are more resilient in periods of financial crisis. Broadstock et al. (2021) explained that the *ESG* portfolio has less variation, and manages to reduce exposure to systematic risk, resulting in less devaluation of the value of securities.

From September 2020 onwards, there was less volatility in the values of the abnormal returns, with average returns closer to those expected, possibly as a result of greater control of the pandemic in the country. The moving average graph shows a drop in the abnormal returns of both portfolios at the beginning of March 2021, which is probably a reflection of the second wave of Covid-19 contamination (Cucolo, 2021).

Figure 1

Graph of Monthly Average Abnormal Returns

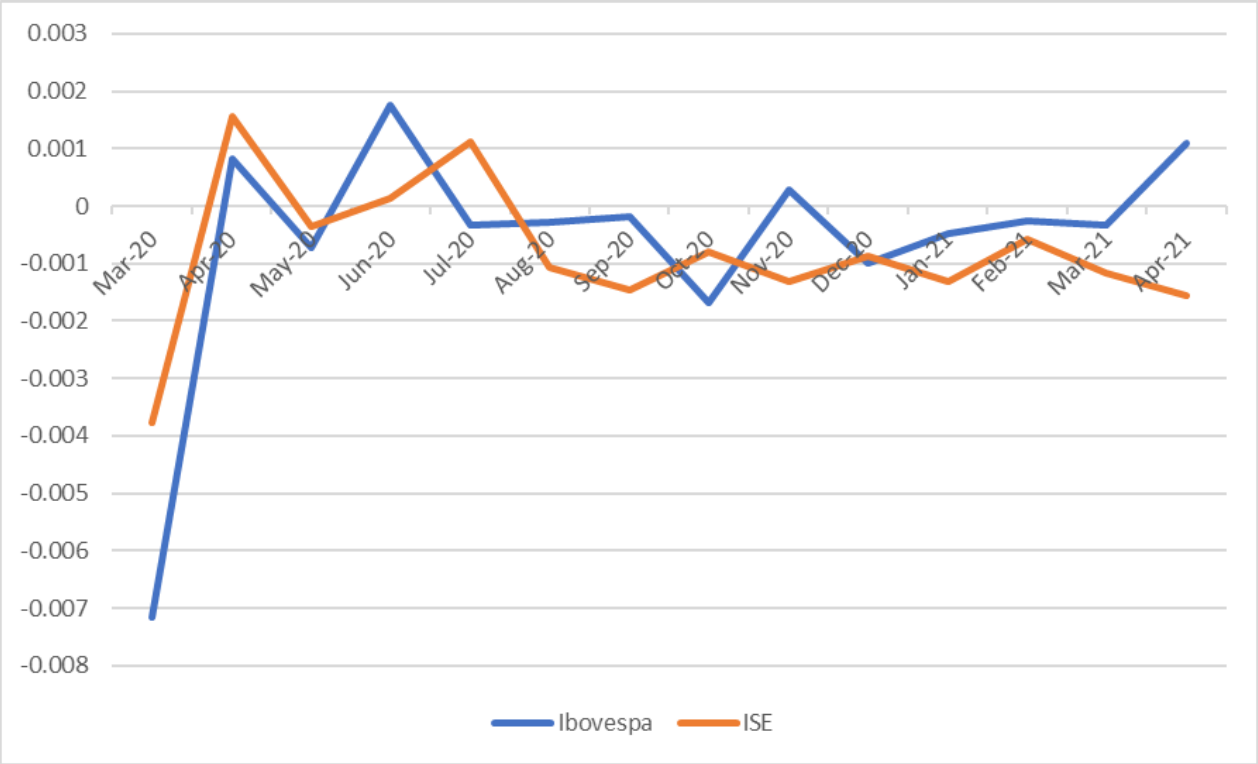
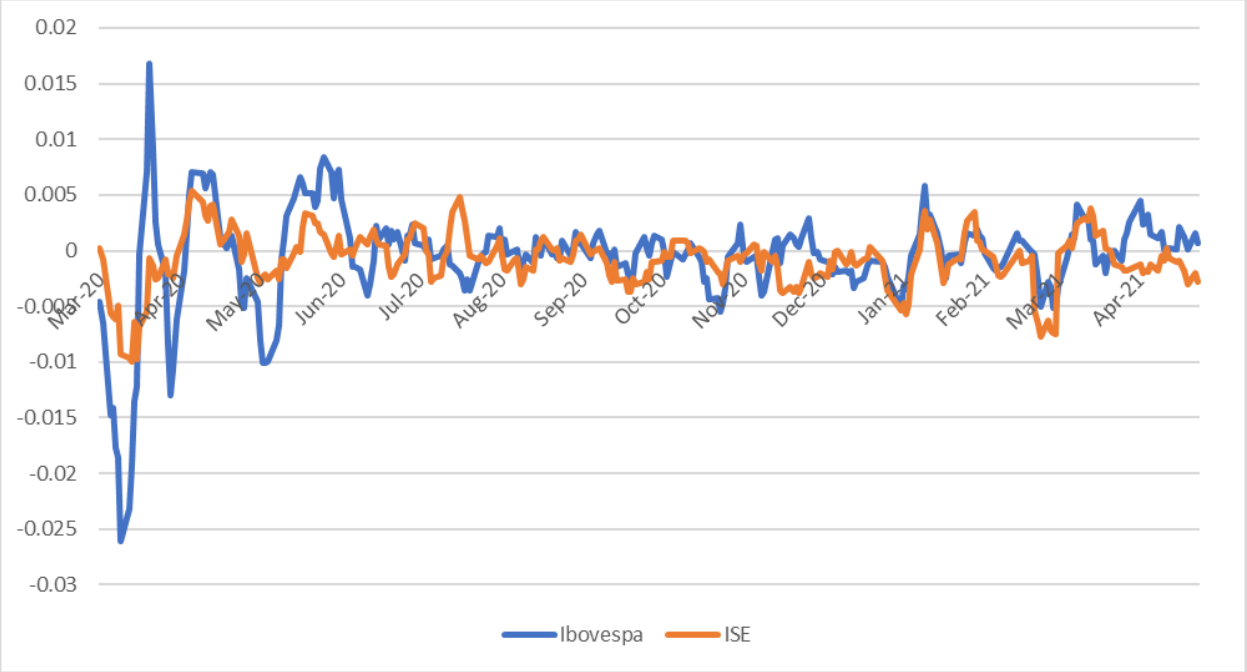


Figure 2
Seven-day Moving Average Chart of abnormal returns

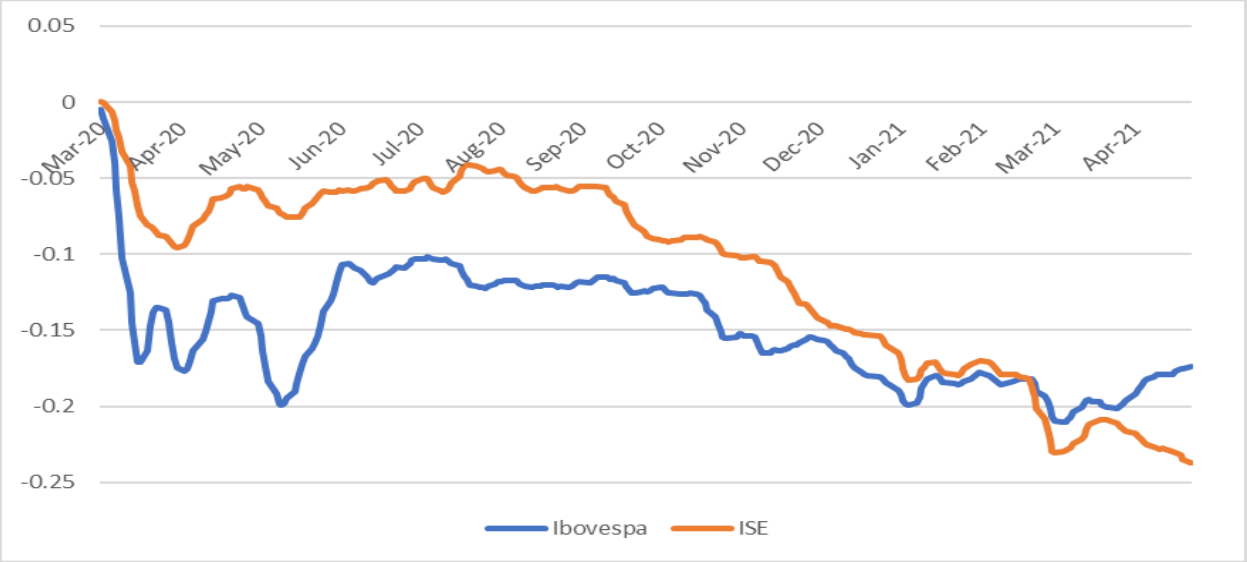


The graph in Figure 3 below shows the cumulative abnormal returns for each portfolio for the total period of the pandemic analyzed. From the graph in Figure 3, it can be seen that the companies in the *ISE* portfolio obtained higher cumulative abnormal returns for the period of the pandemic between March 2019 and March 2020.

This demonstrates how the shares of these companies were more resilient during the crisis period, as predicted by Broadstock et al. (2021).

The higher abnormal returns for the period when the pandemic began may also be related to the fact that high *ESG* performance improves stakeholder confidence in the company (Olli, 2021).

Figure 3
Graph of cumulative abnormal returns



4.3 Analysis of the regression models

As already mentioned, three multiple linear regression models were estimated for each performance variable: *ROA, ROE* and *Tobin's Q*. In addition, due to the presence of heteroscedasticity in the data, *White*'s correction was applied, which provides more robust and unbiased estimators (Fávero et al., 2009).

In addition, the following regression assumptions were tested: normality and multicollinearity. With regard to normality, only three variables have a normal distribution: *CAR*, *SIZE* and *LEV*. However, according to Gujarati (2006), normality is not essential if the objective is simply estimation. The Variance Inflation Factor (VIF) was estimated to investigate multicollinearity problems, but the VIF for the models was low; see tables 5, 6 and 7.

The results for the three regression models are shown in tables 5, 6 and 7, with the coefficients and *t*-statistics for each variable. As can be seen from the regression results, only the interaction between the *Tobin's Q* variable and *ESG* showed statistical significance at 5% (*p-value* < 0.05), although the interactions between *ROA* and *ESG* and *ROE* and *ESG* showed a positive coefficient, indicating a trend, albeit weak, towards better financial performance by companies in the *ISE* sustainability index, a result that is in line with previous research (Azmi et al, 2021; Beloskar & Rao, 2023; Broadstock et al., 2021; Buallay, 2018; Mantovani & Belli, 2019; Olli, 2021).

As argued by Broadstock et al. (2021) and Beloskar and Rao (2023), investors' greater interest in *ESG* investments and their greater resilience and lower volatility are able to provide some protection to investors in periods of crisis. However, as reinforced by Plastun et al. (2021), the opportunity to gain a competitive advantage by investing in an *ESG* portfolio cannot yet be empirically proven, especially in emerging markets. Studies of the Brazilian market have also not identified a significant association between financial performance and *ESG* investments (Crisóstomo et al., 2011; Garcia et al., 2017).

The results indicate that the relationship between *ESG* investments seems to have a positive coefficient only when there is interaction with the financial performance variables, since the *ESG* dummy variable alone is negatively associated with *CAR* in all the models analyzed, possibly indicating that it is not enough for companies to have good *ESG* practices, they also need to have satisfactory financial performance. As pointed out by Bae et al. (2021), investors are wary of companies that present themselves with the image of adopting good *ESG* practices after the Covid-19 crisis, so greater caution is needed when stating that more sustainable companies have achieved better shareholder performance during the pandemic. With regard to financial performance indicators, only *ROA* showed statistical significance, but at 10% (*p-value* < 0.1).

Overall, the control variables *SIZE*, *LEV* and *CAPEX* were statistically significant in explaining the dependent variable *CAR* in the estimated models.

Table 5

Results adjusted by White's Correction for model with ROA

Dependent variable: *CAR*	**Coefficient**	**T-statistic**
ESG	-0.0008781**	(-2.16)
ROA	0.00022*	(1.76)
*ROA*ESG*	0.0000619	(1.22)
SIZE	0.0008877**	(2.21)
LEV	0.0030033**	(2.22)
CAPEX	0.0065102**	(2.44)
F Test		2.47**
Note		75
R^2		0.2715
VIF		1.32

Note. ***0.01; **0.05 and *0.10 is the significance level. *CAR* is cumulative abnormal return. Check the definitions of the variables in Table 2.

Table 6
Results adjusted by White's correction for model with ROE

Dependent variable: *CAR*	**Coefficient**	**T-statistic**
ESG	-0.0006042	(-1.55)
ROE	-0.0000013	(-0.28)
*ROE *ESG*	0.0000076	(1.51)
SIZE	0.000859**	(2.07)
LEV	0.0022772*	(1.84)
CAPEX	0.0071954**	(2.16)
F Test		4.22***
Note		71
R^2		0.2462
VIF		1.37

Note. ***0.01; **0.05 and *0.10 is the significance level. *CAR* is cumulative abnormal return. Check the definitions of the variables in Table 2.

Table 7
Results adjusted by White's correction for model with Tobin's Q

Dependent variable: *CAR*	**Coefficient**	**T-statistic**
ESG	-0.0023898**	(-2.39)
Tobin's Q	-0.0006622	(-1.41)
*Tobin's Q*ESG*	0.0009921**	(2.04)
SIZE	0.000671***	(3.12)
LEV	0.0013654	(1.65)
CAPEX	0.0060674**	(2.28)
F Test		4.48***
Note		75
R^2		0.3755
VIF		1.94

Note. ***0.01; **0.05 and *0.10 is the significance level. *CAR* is cumulative abnormal return. Check the definitions of the variables in Table 2.

5 FINAL CONSIDERATIONS

By analyzing the graphs of average daily abnormal returns and cumulative abnormal returns, it is possible to see evidence that the shares of companies with high *ESG* investment are more resilient in periods of crisis, since the *ISE* portfolio showed lower volatility in returns during the initial period of the Covid-19 pandemic, in addition to not falling as sharply as the Ibovespa portfolio in the same period, as expected from the literature. With this, the hypothesis developed in H1 that *ESG* investments performed better and showed less volatility during the Covid-19 pandemic period is accepted, since ESG investments are more resilient and their growth generates more sustainable returns. The first regression model, with *ROA*, identified a significant negative relationship between *CAR* and *ESG* investment, contrary to expectations. The second model, with *ROE*, found no statistically significant relationship between *ESG* and cumulative abnormal return, as previously expected. The third model also found a statistically significant positive relationship between *ESG* and the value of companies according to *Tobin's Q*, as expected. Nevertheless, H2 was not accepted, since the results were not confirmed for *ROA* and *ROE*. Therefore, it is not possible to state that companies in the *ESG* theoretical portfolio obtained better financial performance.

In summary, this study obtained mixed results. While the graphical results indicate that *ESG* investments affect companies' financial performance, making their abnormal returns more resilient in periods of crisis, the results of the regression models find statistically significant evidence that *ESG* investments have a negative effect on abnormal returns. However, the

regression models also found positive evidence that *ESG* positively affects the value of the company by *Tobin's Q* of the companies. This study has some limitations, such as missing data for some companies and the difficulty of analyzing *ESG* metrics for each company, since there is no standardized disclosure. This study can contribute to the literature, as it broadens the discussion on the effects of *ESG* on the financial performance of Brazilian companies, seeking a relationship between *ESG* factors and *CAR*. The results of this study can contribute to investors, professionals and regulatory bodies in the discussion on the regulation and incorporation of *ESG* factors in accounting and financial reports. Future research is suggested to verify the impact of *ESG* investment during the Covid-19 pandemic crisis for creditors and its relationship with the cost of corporate debt, checking whether credit providers reward companies engaged in corporate responsibility. Another suggestion is to investigate the relationship between *CAR* and *ESG*, which in this study showed a negative sign in tables 5 and 7.

REFERENCES

Albuquerque, R., Kosiknen, Y., Yang, S., & Zhang, C. (2020). Resiliency of environmental and social stocks: An analysis of the exogenous COVID-19 market crash. *The Review of the Corporate Finance Studies, 9*(3), 593-621. https://doi.org/10.1093/rcfs/cfaa011

Azmi, W., Hassan, M. K., Houston, R., & Karim, M. S. (2021). ESG activities and banking performance: International evidence from emerging economies. *Journal of International Financial Markets, Institutions & Money, 70*, 1-18. https://doi.org/10.1016/j.intfin.2020.101277

B3. (2021). *Índice de Sustentabilidade Empresarial*. http://www.b3.com.br/pt_br/market-data-e-indices/indices/indices-de-sustentabilidade/indice-de-sustentabilidade-empresarial-ise-composicao-da-carteira.htm

Bae, H. K., El Ghoul, S., Gong, Z. (J)., & Guedhami, O. (2021). Does CSR matter in times of crisis? Evidence from the COVID-19 pandemic. *Journal of Corporate Finance, 67*, 101876. https://doi.org/10.1016/j.jcorpfin.2020.101876

Beloskar, V. D., & Rao, S. V. D. N. (2023). Did ESG save the day? Evidence from India during the COVID-19 crisis. *Asia-Pacific Financial Markets, 30*, 73-107. https://doi.org/10.1007/s10690-022-09369-5

Broadstock, D. C., Chan, K., Chen, L. T. W., & Wang, X. (2021). The role of ESG performance during times of financial crisis: Evidence from COVID-19 in China. *Finance Research Letters, 38*, 101716. https://doi.org/10.1016/j.frl.2020.101716

Brown, S. J. & Warner, J. B. (1985). Using daily stock returns: the case of event studies. *Journal of Financial Economics, 14*, 3-31.

Buallay, A. (2018). Is sustainability reporting (ESG) associated with performance? Evidence from the European banking sector. *Management of Environmental Quality: An International Journal, 30*(1), 98-115. https://doi.org/10.1108/MEQ-12-2017-0149

Campbell, J. Y., Lo, A., & Mackinley, A. C. (1997). *The econometrics of financial markets*. (1a ed). Princeton University Press.

Cavalcante, L. R. M. T., Bruni, A. L., & Costa, F. J. M. (2009). Sustentabilidade empresarial e valor das ações: uma análise na bolsa de valores de São Paulo. *RGSA – Revista de Gestão Social e Ambiental, 3*(1), 70-86.

Cornell, B., & Damodaran, A. (2020). *Valuing ESG: Doing good or sounding good?* (Working Paper NYU Stern School of Business). New York University, Nova York, NY. https://ssrn.com/abstract=3557432

Crisóstomo, V. L., Freire, F. S., & Vasconcellos, F. C. (2011). Corporate social responsibility, firm value and financial performance in Brazil. *Social Responsibility Journal, 7*(2), 295-309. https://www.researchgate.net/publication/227361439_Corporate_social_responsibility_firm_value_and_financial_performance_in_Brazil

Cucolo, E. (2021, maio 8). *Economistas reveem previsões para 2021 após impacto menor da pandemia na economia*. Folha de São Paulo, Mercado. https://folha.com/0h7o1k2e

El Ghoul, S., & Karoui, A. (2016). Does corporate social responsibility affect mutual fund performance and flows? *Journal of Banking & Finance, 77*, 53-63. http://dx.doi.org/10.1016/j.jbankfin.2016.10.009

Famá, R., & Barros, L. A. B. C. (2000). Q de Tobin e seu uso em finanças: aspectos metodológicos e conceituais. *Caderno de Pesquisas em Administração*, 7(4), 27-43.

Fávero, L. P., Belfiore, P., da Silva, F. B., & Chan, B. L. (2009). *Análise de dados: Modelagem multivariada para tomada de decisões.* (1a ed.). Elsevier.

Garcia, A. S., Orsato, R., & Mendes-da-Silva, W. (2017, maio). O desempenho ESG-Environmental, Social and Governance em diferentes ambientes institucionais. *Anais do International Workshop Advances in Cleaner Production*, São Paulo, SP, Brasil, 6. http://www.advancesincleanerproduction.net/sixth/files/sessoes/5B/3/garcia_as_et_al_academic.pdf

Gillan, S. L., Koch, A., & Starks, L. T. (2021) Firms and social responsibility: A review of ESG and CSR research in corporate finance. *Journal of Corporate Finance, 66*, 1-16. https://doi.org/10.1016/j.jcorpfin.2021.101889

Gujarati, D. (2006). *Econometria Básica* (5a ed.). Elsevier. Tradução de Maria José Monteiro.

Harabida, M., Radi, B., & Gueyie, J.-P. (2022). Socially responsible investment during the COVID-19 pandemic: Evidence from Morocco, Egypt and Turkey. *International Journal of Economics and Finance, 14*(4), 65-74. https://doi.org/10.5539/ijef.v14n4p6

Jagannathan, R., Ravikumar, A., & Sammon, M. (2017). *Environmental, Social, and Governance criteria: Why investors are paying attention*. (NBER Working Paper Series, n. 24063). National Bureau of Economic Research, Cambridge, MA. http://www.nber.org/papers/w24063

Kammer, E. L. & Alves, T. W. (2009). Análise da capacidade explicativa do investimento pelo "Q" de Tobin em empresas brasileiras de capital aberto. *RAE-eletrônica, 8*(2).

http://www.rae.com.br/eletronica/index.cfm?FuseAction=Artigo&ID=4769&Secao=ARTIGOS&Volume=8&Numero=2&Ano=2009

Kanamura, T. (2021) Risk mitigation and return resilience for high yield bond ETFs with ESG components. *Finance Research Letters, 41*, 1-10. https://doi.org/10.1016/j.frl.2020.101866

Khan, M. (2019). Corporate governance, ESG, and stock returns around the world. *Financial Analysts Journal, 75*(4), 103-123. https://doi.org/10.1080/0015198X.2019.1654299

Kirck, G. (2019). Estudo de eventos, estimação do retorno esperado e as condições de mercado. *ConTexto – Contabilidade em Texto, 19*(41), 60-73. https://seer.ufrgs.br/index.php/ConTexto/article/view/94296

Mantovani, A., & Belli, M. M. (2019, outubro). Relação entre responsabilidade social corporativa e valor de mercado das empresas no Brasil. *Anais do Congresso de Iniciação Científica Unicamp*, Campinas, SP, Brasil, 27. https://econtents.bc.unicamp.br/eventos/index.php/pibic/article/view/1875/1935

Nguyen, P. A., Kecskés, A., & Mansi, S. (2020). Does corporate social responsibility create shareholder value? The importance of long-term investors. *Journal of Banking & Finance*, *112*, 1-21. https://doi.org/10.1016/j.jbankfin.2017.09.013

Olli, K. (2021). *Impact of ESG on financial performance: empirical evidence from the European market 2002–2019*. [Dissertação de Mestrado da University of Turku, Turku, Finlândia].

Organização Pan-Americana de Saúde (OPAS). (2020, março 11). OMS confirma que COVID-19 agora é caracterizada como pandemia. https://www.paho.org/pt/news/11-3-2020-who-characterizes-covid-19-pandemic#:~:text=OMS%20afirma%20que%20COVID%2D19%20%C3%A9%20agora%20caracterizada%20como%20pandemia,-Copied%20to%20clipboard&text=11%20de%20mar%C3%A7o%20de%202020,agora%20caracterizada%20como%20uma%20pandemia.

Parmar, B. L., Freeman, R. E., Harrison, J. S., Wicks, A. C., Purnell, L., & de Colle, S. (2010). Stakeholder Theory: The state of the art. *Academy of Management Annals, 4*(1). https://doi.org/10.5465/19416520.2010.495581

Plastun, A., Bouri, E., Gupta, R., & Ji, Q. (2021). Price effects after one-day abnormal returns in developed and emerging markets: ESG versus traditional indices. *North American Journal of Economics and Finance, 59*, 1-12. https://doi.org/10.1016/j.najef.2021.101572

Shehzad, K., Xiaoxing, L., & Kazouz, H. (2020). COVID-19's disasters are perilous than global financial crisis: a rumor or a fact? *Finance Research Letters*, 101669. https://doi.org/10.1016/j.frl.2020.101669.

Silva, M. B., & Câmara, S. F. (2015). A governança corporativa como um diferencial para o valor de mercado das empresas listadas na BM&FBOVESPA no ano de 2012. *GECONT – Revista de Contabilidade e Gestão da UFPI, 2*(1), 152-170. https://doi.org/10.26694/2358.1735.2015.v2ed13579

Soares, R. O., Rostagno, L. M., & Soares, K. T. C. (2002). Estudo de evento: o método e as formas de cálculo do retorno anormal. *Anais do Congresso ENANPAD*, Salvador, BA, Brasil, 26.

Yoo, S., Keeley, A. R., & Managi, S. (2021). Does sustainability activities performance matter during financial crisis? Investigating the case of COVID-19. *Energy Policy, 155*, 112330-1-11. https://doi.org/10.1016/j.enpol.2021.112330

AUTHOR CONTRIBUTIONS

Roles	1º autor	2º autor
Conceptualization	♦	♦
Data curation		♦
Formal analysis		♦
Funding acquisition	Does not have	
Investigation	♦	♦
Methodology	♦	♦
Project administration	♦	♦
Resources	♦	♦
Software		♦
Supervision	♦	♦
Validation	♦	♦
Visualization	♦	♦
Writing – original draft	♦	♦
Writing – review & editing	♦	♦

CONFLICT OF INTEREST

The authors assert that there is no conflict of interest related to this submitted work.